NOTES.

THE Committee of Administration of the Paris International Exhibition of 1900 have adopted a scheme of arrangement of the exhibits according to the nature of the objects, instead of by nationalities. The exhibits will be arranged in groups, containing between them 120 classes. The subjects of the groups are: education and teaching, literature, science and art, instruments and processes; machinery and mechanical processes; civil engineering, construction, means of transport; agriculture, horticulture, arboriculture, forestry, sport, &c.; alimentary products; mines and metallurgy; decoration and furniture of public and private buildings; yarns, fabrics, clothing; industrial chemistry; miscellaneous industries; social economy, hygiene, public charities; colonisation; naval and military.

PRINCE ALBERT OF MONACO gave an account of his investigations in the Atlantic at the meeting of the Royal Geographical Society on Monday. From 1885 to 1889 Prince Albert made some long cruises in the *Hirondelle*, a little sailing schooner of 200 tons, which took him as far as the American coasts, and he explored depths as great as 1600 fathoms without help of any power greater than the arms of his fourteen sailors. The *Hirondelle* being shattered by storms, he built a stronger steam-vessel, the *Princess Alice*, 560 tons, to carry on the same research with better appliances. The work of this second period opened up to him fields of labour altogether beyond his reach without the aid of a still larger and more powerful vessel, so he commissioned Messrs. Laird, of Liverpool, to build him another *Princess Alice*, which is expected to set out on her first voyage in a few weeks. After giving the results of the more important of his observations with respect to currents, depth and pressure, temperature, salinity, light, and ocean deposits, Prince Albert proceeded to treat of the organic life inhabiting the waters of the open ocean, and described the principal apparatus employed by him for biological investigations.

MR. W. H. PREECE, C.B., F.R.S., was elected president of the Institution of Civil Engineers at the annual general meeting held on Tuesday.

MR. J. J. H. TEALL, F.R.S., has been elected into the Athenæum Club, under the rule which empowers the annual election of nine persons "of distinguished eminence in science, literature, the arts, or for public services."

THE Royal Photographic Society's International Exhibition was opened by the Prince of Wales at the Crystal Palace on Monday. A large number of interesting photographs, many of them illustrating scientific applications of photography, are included among the exhibits.

THE annual reception and exhibit of recent progress in science of the New York Academy of Sciences was held on April 13 and 14. Though not so large as former exhibitions, it was characterised by the president of the Academy, Prof. Henry F. Osborn, as the most complete and diversified of any, representing nearly all the leading educational institutions of the United States, and containing exhibits from very many of the States and many foreign countries. Addresses were delivered by the recording secretary, Prof. Richard E. Dodge, President Osborn, Prof. George E. Hale, of the Yerkes Observatory, on "The Function of Large Telescopes," Mr. Morris K. Jesup, president of the Museum, and Mr. Charles E. Tripler, who exhibited liquid air obtained by his apparatus. Among the objects included in the exhibition, the fine array of photographs of stars and star spectra was noticeable. In the department of photography some excellent colour photographs were shown, including a demonstration of colour photographs by the Joly process, shown by the Joly-Zambra Company.—In electricity, apparatus was exhibited for the transmission of signals without intervening wires. The feature of the palæontological exhibition was the caudal vertebræ and limb bones of the gigantic Dinosaur Camarasaurus, the largest land animal that ever lived. The bones exhibited were the largest yet found, and were recently exhumed. Several new kinds of apparatus were shown in the physics section. Specially important, in an economic sense, was the stremmatograph, an instrument to measure compression and extension of rails of a railroad during the passing of trains, exhibited by Mr. P. H. Dudley.—The geological exhibit contained many interesting features; including specimens brought back from the excursion of geologists after the geological congress in Russia last year, some of the latest maps of the U.S. Geological Survey, a model of the Franklin furnace zinc ore bed from New Jersey, gold-bearing conglomerates from the so-called "banket" reefs near Johannesburg, South Africa. Specimens of compressed marble were shown, which had been subjected to the pressure of 100 tons to the square inch without rupture or destruction of cohesion.—Mr. H. E. Crampton, jun., exhibited some fine specimens of fused or compound pupæ and compound adult moths. His recent products include some very perfect tandem moths with two full sets of wings; also moths which have the head of one grafted upon the back of another. The exhibition of ethnology included results of the Jesup North Pacific exploring expedition and collections of the Huichol Indians of Mexico. The exhibits generally were designed to show the progress made during the year. The department of philology, however, having only been added to the exhibition this year, took a wider range.

IT is announced in *Science* that at the recent annual meeting of the New York Academy of Sciences the following elections as Honorary and Corresponding Members were made: *Honorary*—Prof. Arthur Auwers, Astronomer, Berlin; Prof. W. K. Brooks, Biologist, Baltimore; Prof. David Gill, Astronomer, Cape Town; Dr. George W. Hill, Mathematician, Nyack; Prof. E. Ray Lankester, Zoologist, Oxford; Dr. Fridjof Nansen, Explorer, Kristiania; Prof. Albrecht Penck, Geographer, Vienna; Prof. Wilhelm Pfeffer, Botanist, Leipzic; Prof. Hans Reusch, Geologist, Kristiania; Prof. Rudolph Virchow, Biologist, Berlin; Prof. Karl von Zittel, Palæontologist, Munich. *Corresponding*—Prof. F. D. Adams, Geologist, Montreal; Prof. I. B. Balfour, Botanist, Edinburgh; Prof. George Baur, Palæontologist, Chicago; Prof. William Carruthers, Botanist, London; Prof. T. C. Chamberlin, Geologist, Chicago; Prof. Wm. M. Davis, Geographer, Cambridge; Prof. Adrien Franchet, Botanist, Paris; Prof. George E. Hale, Astronomer, Chicago; Prof. J. P. Iddings, Geologist, Chicago; Prof. Charles S. Minot, Biologist, Boston; Prof. George Murray, Botanist, London; Prof. William B. Scott, Geologist, Princeton; Mr. Charles D. Walcott, Geologist, Washington; Prof. Charles O. Whitman, Biologist, Chicago; Prof. Henry S. Williams, Palæontologist, New Haven.

A VERY elaborate series of experiments on the tractive resistance of express passenger trains running on the Northern of France Railway shows (says *Engineering*) that the engine and tender resistances amount to about half the total. The trains on which the experiments were made weighed, on the average, 160 tons, exclusive of the engine and tender, which weighed 85 tons more.

THE Royal Agricultural Society offers, in connection with the meeting at Maidstone next year, a prize of 50*l.* for the best machinery for washing hops with liquid insecticides, the machine in question being worked by horse or mechanical power. Full particulars of the regulations governing the proposed competitive trials can be obtained on application to the Secretary, 13 Hanover Square, London, W.

Prof. James E. Keeler, of the Allegheny Observatory, has definitely accepted the post of director of the Lick Observatory, and will go to Mount Hamilton next month. It will be remembered that he offered to remain at the Allegheny Observatory if 200,000 dollars could be collected to erect and endow a new observatory. The subscriptions did not reach this amount in the two weeks allowed, but 150,000 dollars was subscribed, so that a new observatory will be built.

A new coherer for use in connection with telegraphy without intervening wires has been invented by Dr. H. Rupp, of Stuttgart. Instead of using an electro-magnetic tapper to tap the coherer tube, and so loosen the iron filings in it, Dr. Rupp has devised a simple contrivance for making the coherer rotate round the axis of the leading-in wires. It is stated that the Morse signals obtained with this rotating coherer are much more distinct than those given by the tapping arrangement.

Dr. Henry Marshall, a distinguished member of the medical profession, died on Sunday at Clifton, Bristol. Dr. Marshall received his medical education at Edinburgh; and in 1854, was dresser and afterwards assistant under Lord Lister, whom he succeeded as house surgeon. Whilst in Edinburgh he held the presidency of the Royal Medical Society there. When the British Medical Association met at Bristol in 1863 Dr. Marshall acted as secretary, and he was president of the Bristol branch when in 1877 the Association met at Bath.

We have just received, with regret, the announcement of the death, on March 24, of Mr. Alfred U. Allen, of Bath, at the age of sixty-four. Mr. Allen's name will be long remembered by microscopists as the secretary of the Postal Microscopical Society, which came into existence about twenty-five years ago largely through his exertions. It is only a few months since we announced that Mr. Allen had found it necessary to discontinue the *Journal of Microscopy and Natural Science*, which he edited since 1882. In addition to this, Mr. Allen issued a monthly journal, under the title of *The Scientific Enquirer*, during the years 1886–88.

Col. Sir Vivian D. Majendie, K.C.B., the chief inspector of explosives to the Home Office, died suddenly on Sunday. He was the author of the Official Guide-book to the Explosives Act of 1875, and several other professional works. In his official capacity he was responsible not only for the periodical inspection of the various gunpowder and kindred manufactories scattered throughout the country, and for the investigation of the circumstances attending the accidents that occur in them from time to time, but also had to examine very many of the bombs and infernal machines that fell into the hands of the police, or were left for felonious purposes in public places. He was also concerned with drawing up regulations for the storage of inflammable liquids such as petroleum, and it is not very long since he returned from a tour in America undertaken to study the methods of storage and transport in operation there.

Zoology has lost an able student and a promising investigator by the death, at the age of twenty-six years, of Mr. B. B. Griffin, announced in *Science*. Mr. Griffin took part in the zoological expeditions to the north-west coast of America, sent out by Columbia University in 1896 and 1897. He was the author, wholly or in part, of several papers relating to the fauna of that region, one of which, dealing with the nemertines of Puget Sound and describing a number of species new to science, had been sent to press immediately before his last illness. His principal work lay, however, in the field of cellular biology, and a brief but important paper by him on the fertilisation of the egg in *Thalassema*, published in the *Transactions* of the New York Academy of Sciences for 1895–6, had attracted considerable attention, both in the United States and elsewhere. A more extended paper along the same lines, bringing forward new and important evidence on the nature of fertilisation, the history of the centrosome, the phenomena of chromatin-reduction and other vexed problems of cytology, was practically ready for the printer at the time of his death.

We regret to record the death of the distinguished geologist M. Jules Marcou. He was born at Salins in the Department of Jura in France, in 1824. In 1848 he joined Agassiz at Boston, in the United States, and spent two years in studying the geology of various portions of North America. In 1853 he published a Geological Map of the United States, and the British Provinces of North America. For a period of about twelve years M. Marcou appears to have spent much of his time alternately in Europe and America. In 1855 he became professor of geology and palæontology at the Polytechnic School of Zürich, but relinquished this office on his return to the United States in 1860. In 1861 he published his well-known Geological Map of the World, of which a second edition was issued in 1875. In addition to his works on the geology of North America, he published many papers on the European secondary rocks, and was specially interested in the Jura-Cretaceous formations. Some of his articles were of a controversial nature. In 1879 he was elected a Foreign Member of the Geological Society of London. He died on April 18, at Cambridge, Massachusetts, aged seventy-four.

It is with much regret that we record the death of Dr. John Shearson Hyland, F.G.S., at the early age of thirty-two. The second son of Captain P. Hyland, of Great Crosby, he was educated at the Merchant Taylors' School, at University College, Liverpool, and subsequently at Leipzig. At the University of Leipzig he studied mineralogy and petrology under Dr. Zirkel, and took the degree of Ph.D., his thesis being entitled "Ueber die Gesteine des Kilimandscharo und dessen Umgebung," and published in 1888. In the same year he joined the staff of the Geological Survey, and was for three years occupied in the Irish branch in investigations on the eruptive rocks of the country. During this period he published several papers on petrological subjects, and gave great promise of a brilliant career. Being of an active, enterprising nature, he relinquished the work of the microscope, and throwing up his post on the Geological Survey, took to the more practical work of reporting on mineral resources in the United States, subsequently in British Central Africa, and finally on the treacherous west coast of Africa, where he died at Elmina on April 19.

The death is announced of Dr. J. G. N. Dragendorff, for many years director of the Pharmaceutical Institute at Dorpat, in Russia, which, while he was there, had the highest reputation as a pharmaceutical training college and school of research. From the *Chemist and Druggist* we learn that Dr. Dragendorff was born in Rostock in 1836. After qualifying as an apotheker, he studied chemistry in the Heidelberg University, which he left in 1860 to become assistant to Prof. F. Schultze, in the chemical laboratories of the Rostock University. In the same year he graduated as Ph.D., his thesis being on the action of phosphorus upon some carbonates and borates. In 1862 he went to St. Petersburg to take charge of the *Pharmaceutischen Zeitschrift für Russland*, as editor, and of the laboratories of the Pharmaceutical Society there. While acting in that capacity his reputation grew, and his appointment as Professor of Pharmacy and Director of the Pharmaceutical Institute at Dorpat in 1864 was the beginning of thirty years' work which made the Dorpat Institute famous all over the world, for Dragendorff's skill as a teacher and discoverer of talent brought students to him from all quarters. He retired to his native town in 1894, and devoted his leisure to a monumental work on medicinal plants, of which at least one part has been published. He was best known to English pharmacists through his "Plant Analysis," a translation of which, by his former pupil, Henry G. Greenish, was published in 1883. His work on alkaloids was, however, that by which he is most entitled to fame. The mydriatic alkaloids were his special field, and his syntheses of conine and atropine are amongst the most brilliant achievements of modern chemistry. In 1885 the Pharmaceutical Society of Great Britain conferred the third Hanbury medal upon him.

THE Kew Observatory Committee have issued their Report for the year 1897. During that period the magnetic curves have been free from any very large fluctuations; the mean westerly Declination for the year was 17° 6′, and the mean Inclination, 67° 20′. The meteorological observations conducted for the Meteorological Council call for no special remarks; the electrograph has been in nearly constant operation since January 19. Several hours' record were lost owing to the trace being off the sheet; Dr. Chree states that it is difficult to see how such loss can be avoided without either duplicating part of the apparatus, or by risking possible loss of negative trace by shifting the position of the zero line on the sheet. Sketches of sun-spots were made on 165 days; it has been decided to discontinue the eye observations, owing to the elaborate photographic work now done elsewhere. Among the various experiments and researches in connection with the several departments we observe that attention has been given to the comparison of platinum and mercury thermometers at high temperatures, in view of repeated requests for direct high temperature verifications. Experiments are also being made as to the thermometric properties of different kinds of glass, the results of which will be eventually published. The usefulness of the institution is shown by the continual increase in the number of instruments submitted for verification; the increase during the year in question amounted to nearly three thousand. In addition a large number of watches and marine chronometers were received for trial.

A NUMBER of investigations have been made on the connection of various terrestrial phenomena with the period of rotation of the sun, but the results obtained have not been definite enough to establish the reality of a twenty-six-day period of meteorological phenomena. In connection with this question, Prof. Arthur Schuster subjects the methods of finding hidden periodicities—small periodic variations hidden behind irregular fluctuations—to vigorous analysis in *Terrestrial Magnetism* (March), with the object of introducing a little more scientific precision into the treatment of problems involving hidden periodicities, and of applying the theory of probability in such a way as to assign a definite number for the probability that the effects found by means of the usual methods are real, and not due to accidental circumstances. The methods described show the lines which investigations on the periodicity of phenomena should follow, and point to several interesting subjects to which they may profitably be applied. As to results already published, Prof. Schuster concludes:—"The general result of a critical examination of the published investigations on the twenty-six-day period leads me to think that, although the magnetic elements and the occurrence of thunderstorms seem to be affected by a period of twenty-six days and of its first multiple, the subject requires a good deal of further study before we can be sure as to the exact nature of the period. Even though it may be considered as proved, it must not be necessarily assumed that it is due to solar action. If it was a question merely of magnetic disturbances, there does not seem to be any great improbability, however, that some periodicity may be connected with the sun's rotation about its axis, especially at times of great sun-spot activity."

IN a short note in the *Comptes rendus* (No. 15, April 1898), M. Thiébaut gives us the result of his investigations on the frequency of the extra large tides which occur at the March equinox. He has used the number previously published in the *Connaissance de Temps* since the beginning of the century, and has shown that the relative magnitude of the coefficients of the tides at the syzygies vary notably from one year to another, but that the rule given below is subject to some exceptions. From the theoretical point of view this law of the variation of the coefficients assigns to the return of this great tide a period of about nine years if only one equinox is considered, or four and a half years if one indifferently takes account of the spring or autumn equinoxes. The principal cause of these variations he attributes to the movement of the moon's perigee, which completes one revolution in about 8 years and 310 days. Taking into account all the circumstances of the phenomenon he discovered a remarkable period of 412 days, at the completion of which the sun returns to the lunar perigee. This period he calls the "année périgéenne"; and it does not differ very much from two other interesting periods, one of 413·4 days, which corresponds to 14 lunar months (synodic), the other of 413·3 days, or 15 anomalistic months.

THE theory which attributes volcanic eruptions to disturbances produced beneath the earth's crust by luni-solar tide-generating forces would receive striking confirmation by the establishment of a connection between the periods of greatest volcanic activity and the phases of the moon which give rise to spring tides. Prof. Eugenio Semmola, writing in the *Atti del R. Istituto d'Incoraggiamento* (Naples), has compared the periods of maximum and minimum activity of Vesuvius with the phases of the moon during the two years from July 1895 to July 1897. The conclusions drawn from these observations are entirely of a negative character; the number of days of maximum and minimum activity being largely in excess of the number of lunations in the same period, and the fresh flows of lava being distributed fairly evenly between the moon's four quarters. A comparison of the more violent eruptions of Vesuvius from the year 1800 to the present time shows that in five of these the nearest phase of the moon was the new or full moon, and in the remaining five the nearest phase was the first or last quarter. It thus appears that no relation exists between the activity of Vesuvius and the phases of the moon.

THE *Journal de Physique* for April contains the continuation of an important paper, by M. A. Leduc, on the densities and molecular volumes of gases. M. Leduc has established, under the name of "law of molecular volumes," a limiting law, which he proposes as a substitute for the principle of Avogadro and Ampère. This law he applies to the calculation of the densities and coefficients of expansion of a number of gases, and every experimental determination appears to agree with the predicted results.

IN the same journal, M. J. Macé de Lépinay gives a proof that the fringes of caustics and the supernumerary arcs of rainbows can be regarded as true interference-fringes.—M. P. Morin considers the influence of the length of magnets on their mean intensity of magnetisation. In needles of the same material and cross-section magnetised to the point of saturation, the intensity of magnetisation and the magnetic density at the two ends are independent of the length of the needle, and the same is the case for all sections taken at equal distances from the extremities.

NEW magazines devoted to discussion of the Röntgen rays appear to be springing up in every direction. From St. Louis we have received the *American X-Ray Journal*, which is stated on the cover to be "a monthly devoted to the practical application of the new science and to the physical improvement of man." It is illustrated by very fair radiographs of fractures and dislocations, and a somewhat striking "skiagram" of a loaded Lebel rifle.

We have received the second part of the *Annales d'Électrobiologie, d'Électrothérapie et d'Électrodiagnostic*. This new bimonthly journal deals with the applications of electricity to medical purposes, including the uses of Röntgen rays. In addition to original papers, a full bibliography of current literature is given. M. Félix Alcan, of Paris, is the publisher.

Writing in the *Rendiconti del R. Istituto Lombardo*, xxxi., Signor Luigi de Marchi criticises the views advanced by Arrhenius on the causes of the variations of climate considered specially with reference to the influence of carbonic acid on the temperature of the ground (see *Philosophical Magazine*, 1896, p. 237). He considers that Arrhenius is in error (1) in treating as negligible the variations in the solar radiation produced by even considerable increases in the carbonic acid and watery vapour of the atmosphere; (2) in attributing a definite physical meaning to the coefficient which represents the coefficient of emission of a fictitious stratum whose radiation is equivalent to that of the atmosphere; and (3) in assuming that the same coefficient also represents the coefficient of absorption of the stratum in question for terrestrial radiations.

The Astronomical and Physical Society of Toronto seems to be in an ever flourishing condition, judging from the *Transactions* which appear from time to time. The latest volume, for the year 1897, which includes the eighth annual report, displays the Society's activity by the numerous and varied papers which were communicated during the past twelve months. Among these papers may be mentioned an historical sketch of the Greenwich *Nautical Almanac*, periodicity of magnetic elements, the November meteors of 1832 and 1833, the variable star Algol, &c. Mr. G. E. Lumsden made a short communication on the best method of making the work of the Society valuable, and his suggestions are such that any other society might learn a good lesson by following them. We hope to see this scheme carried out successfully, as its lines, corresponding to those of the subdivision of labour of the British Astronomical Association on this side of the Atlantic, are undoubtedly sound.

Several interesting reminiscences of the Edinburgh Medical School in the 'fifties and 'sixties are given in an article in *Chambers's Journal* for April. The teachers in the University at that time—Syme, Simpson, Goodsir, Christison, Hughes-Bennett, Playfair, Douglas Maclagan, Laycock, Turner, Allmann, Balfour, Henderson and the rest—all take prominent places in the history of the science and practice of medicine. Referring to Sir James Simpson and the use of chloroform, the writer remarks that deaths under this anæsthetic were almost unknown in his days. He says: "We hardly ever used a stethoscope to examine the heart, or felt the pulse, and the patients did not die. . . . Both Simpson and Syme taught that chloroform should be inhaled from being sprinkled on a towel, the two golden rules being to see that the vapour was properly diluted by the surrounding air, and to watch the breathing, holding the towel some inches from the face. It may be a coincidence merely; but if so it is remarkably strange that, while the chloroform has not changed, while the constitutions of the patients have not changed, where the use of an inhaler is the rule, there are frequent deaths from chloroform; whilst in Scotland and Ireland, where the use of an inhaler is the exception, deaths are proportionately rare."

Some interesting investigations on the behaviour of micro-organisms in the presence of compressed gases have been published by G. Malfitano in the *Bollettino della Società medico-chirurgica di Pavia*. The more importance attaches to these researches, inasmuch as compressed carbonic acid gas has been lately regarded by some authorities as endowed with trustworthy antiseptic or sterilising properties. Malfitano's investigations do not, however, support this view. A large number of experiments were made with pure cultures of various bacteria in a dry condition, exposed for periods of time varying from 20 to 64 hours to a maximum pressure of 55 atmospheres. Whilst some bacteria were destroyed, amongst which we note *B. coli communis*, *B. anthracis*, *saccharomyces cerevisiæ*, the hyphomycetes, and *B. subtilis*, invariably withstood this influence. In other experiments we find again a large number of bacterial varieties exposed to pressures varying from 60-25 atmospheres, with the result that whilst typhoid and cholera bacilli, the *B. prodigiosus*, staphylococcus pyogenes aureus, and citreus and other well-known varieties succumbed more or less rapidly, *B. subtilis*, *B. mesentericus*, Tyrothrix, and *B. œdematis* invariably survived. It should be mentioned that no permanent biological modification in the bacteria employed was observed to result from exposure to compressed carbonic acid gas. Judging by experiments carried out to ascertain the relative effect of length of exposure to, and degree of pressure of this gas upon bacteria, it would appear that the latter factor was of more importance than the former. Endeavours were made to, if possible, increase the bactericidal potency of the gas, by submitting bacteria to the *interrupted* action of the gas. For this purpose subtilis bacilli, containing their well-known hardy spore forms, were employed. These bacilli were exposed for 20 hours to the gas at intervals of 24 hours, this being repeated four times, but no different result followed. It will be remembered that alternately freezing and thawing bacteria tends to increase the sensitiveness of, at any rate, some bacteria to extreme cold. The author tried, finally, the effect of liquefied carbonic acid gas upon the vitality of the spores of *B. subtilis*; but from this test, also, they emerged triumphant, suffering no damage at all.

The current number of the *Journal of the Sanitary Institute* contains papers on a variety of subjects; amongst them we notice one on poisoning by canned foods, by Dr. F. Brown. The writer has collected all the reports which have appeared in medical journals since the year 1879 of cases of poisoning from tinned foods. As regards fish and meat thus preserved, the poisonous effect is probably due to the presence of ptomaïnes, and the only way of preventing this dangerous deterioration is to take all possible precautions that the materials used are of the very best quality, and that the canning process is carried on under the strictest hygienic conditions. Canned fruits do not appear to have been responsible for any fatal cases of poisoning, but salts of tin and zinc are frequently present in such materials. In some instances, especially in cans containing pears and apricots, lead in quantities sufficient to give rise to lead-poisoning was found, whilst in other canned fruits the apricots had acquired a metallic taste from the amount of metal present. As all canned foods are better for being used soon after canning, a good plan would be to state on each tin the date of its canning, so that the public may have some guide as to the quality of the article they are purchasing.—A paper on the contamination of water supplies by encampments of hop-pickers, gipsies, &c., is contributed by Miss Chreiman. Although some allowance must be made for the unfortunately exaggerated style of the writer, there can be no doubt that she has done good service in once more bringing before the general public the highly unsatisfactory conditions under which hop-picking is now carried on. Possibly the Maidstone typhoid epidemic of last autumn may succeed in rousing local authorities to take effective measures to provide for, and officially organise, this periodic invasion of country districts. Surely, for example, the sleeping on "beds of short straw, beneath which was a mattress of cattle manure two spades deep," ought to be an impossibility at the close of the nineteenth century.

A preliminary report, by Mr. Milton Whitney, upon the soils of the principal tobacco districts in the United States has just been published by the United States Department of Agriculture. The tobacco-plant readily adapts itself to a great range of climatic conditions, and will grow on nearly all kinds of soil, but the flavour and quality of the leaf are greatly influenced by the conditions of the climate and soil. So far as climate is concerned, Mr. Whitney remarks that experience is the only safe test as to the class of tobacco which can be produced under given climatic conditions. Ordinary meteorological records appear to be of little value in determining this point; for the tobacco-plant is more sensitive to meteorological influences than the instruments. Even in such a famous tobacco region as Cuba, tobacco of good quality cannot be grown in the immediate vicinity of the ocean, or in certain parts of the island, even on what would otherwise be considered good tobacco lands. This has been the experience also in Sumatra and in the United States, but the influences are too subtle to be detected by ordinary meteorological instruments. Little, therefore, can be said at the present time in regard to the suitable climatic condition for tobacco of any particular type or quality. Under given climatic conditions, the class and type of tobacco depend upon the character of the soil, especially on the physical character of the soil, upon which it is grown. The texture or coarseness of the soil grains, and the water content, which is largely dependent upon it, appears to determine and control the distribution of the different widely distinct types of tobacco. This conclusion is borne out by Mr. Whitney's mechanical analyses of tobacco soils, consisting of separating the particles of soils into grades of different sizes. The results show a very marked difference in the texture and physical properties of the soils adapted to the different classes, types, and grades of tobacco, and give a basis for the classification of tobacco soils.

Dr. Supan has a short article on antarctic exploration in *Petermann's Mittheilungen*. The German and English proposals are described, and Brückner's calculations of climatic periods quoted to show that the present is an exceptionally favourable time for penetrating southward. The period of Ross's voyages was probably much colder than the average.

Dr. Erich von Drygalski publishes in *Petermann's Mittheilungen* a paper on ice movements, their physical causes, and their geographical effects. The paper is in effect an abstract of results of the work of the Greenland expedition of the Berlin *Gesellschaft für Erdkünde*, published in full as a separate volume in the course of last year.

The April issue of the *National Geographical Magazine* is a Klondike number, and contains several trustworthy articles on the conditions, resources and future of Alaska and the Yukon gold-fields. A map of the gold- and coal-fields of Alaska, and showing also the principal steamer routes and trails, on a scale of about fifty-seven miles to one inch, accompanies the papers in the magazine.

Nos. 5 and 6 of vol. xxxii. of the *Zeitschrift der Gesellschaft für Erdkünde zu Berlin* contain papers by Herr E. de Martonne on the hydrography of the basin of the Upper Nile, by Dr. A. Galle on Dr. Philippson's measurements of heights on the Greek islands of the Ægean, on a new map of the eastern part of New Britain by Freiherr von Schleinitz, and on journeys in the Upper Amazon region by Dr. A. Rimbach. Herr E. de Martonne's paper is a review of the present state of knowledge regarding the Upper Nile, with a new orographical map and a sketch of seasonal distribution of rainfall.

Among the papers in the current number (April) of the *Journal* of the Royal Horticultural Society are several of scientific interest, in addition to papers on progress in the methods and results of cultivation. Mr. C. C. Hurst describes some curiosities of orchid breeding, and his experiments and observations on hybrids are of distinct value. Prof. F. W. Oliver has a paper on the depth in the soil at which plants occur, and Prof. Geo. Henslow one on chrysanthemum sports.

Among reprints of important papers from the *Botanical Gazette* we have received:—Winter characters of certain sporangia, by Charles J. Chamberlain; contributions to the life-history of *Ranunculus*, by Prof. Coulter; and a general review of the principal results of Swedish research into grain-rust, by Prof. J. Eriksson. The Swedish professor distinguishes eight distinct forms of *Puccinia* which produce rust; these being again arranged under a number of secondary forms, dependent on the host-plant, most of the primary forms being parasitic on several different species.

The views with regard to the origin of vertebrates, put forward by Dr. W. H. Gaskell, F.R.S., in his presidential address to the physiological section of the British Association, at the Liverpool meeting in 1896, are to be stated more fully in the *Journal of Anatomy and Physiology*. The April number of the *Journal* contains the first of a series of papers in which Dr. Gaskell will fill in the details of evidence which were necessarily omitted from his address.

A copy of Mr. Joseph Baxendell's report on the results of observations made at the Southport Corporation Meteorological Observatory during 1897 has been received. A noteworthy feature of the report is a comparative table showing the mean annual meteorological statistics for every health resort in the United Kingdom known to possess a meteorological station. The systematic work done in the meteorological department of the borough of Southport should encourage accurate health resort climatology in general, and municipal meteorology in particular.

Included in the "Bergens Museums Aarbog" for 1897 is Prof. R. Collett's interesting paper on Beavers in Norway, with twelve plates reproduced from photographs of beaver lodges and dams. The subjects of other papers are:—Generalisation of some algebraic equations which present themselves in the theory of elliptic functions; a Sowerby Whale (*Mesoplodon bidens*, Sow.), stranded on the west side of Karmö Island; histological studies of the structure of the eyes of certain marine annelids; a generalisation of the Lamé equation; the Lepidoptera of North Bergen county; physical conditions and plankton of Puddle fiord.

In a memoir which appears in the *Proceedings* of the U.S. National Museum (vol. xx. pp. 1–421, 1897), Mr. S. H. Scudder describes in detail and discusses the classification of a group of grasshoppers which forms the prevailing type of orthopteran life throughout North America—the short-horned grasshopper commonly seen in the United States, its best-known representative to the world at large being the destructive migratory Rocky Mountain Locust. The title of Mr. Scudder's paper is "Revision of the Orthopteran Group Melanopli (Acridiidæ), with special reference to North American forms."

The natural history societies of our public schools deserve encouragement, for they create interest in natural things and phenomena, and lead inquiring minds to make observations for themselves. The reports of three such societies, namely those of Rugby, Wellington, and Cheltenham, showing the results of observations, and containing abstracts of lectures, have been received, and each of them is a creditable production. Among the papers which call for special attention is an essay upon the birds of the Oxford district, by Mr. F. Sidgwick, in the Rugby Society's report; and one on birds and birds-nesting, by Mr. C. Montford, in the Cheltenham Society's report.

ARCHÆOLOGISTS will be interested in a paper on "Dwellings of the Saga-time in Iceland, Greenland, and Vineland," by Cornelia Horsford, which appears in the *National Geographic Magazine* (March). The Saga-time began with the colonisation of Iceland in 875, and lasted for about 150 years, but little definite knowledge exists as to the forms of the dwellings in those days. The paper is illustrated by plans of Norse ruins (so far as they are known) in Iceland and Greenland, and of a supposed Norse ruin in Massachusetts. It will enable a comparison to be made between the different dwellings of the Northmen and those of the native tribes of North America, from the magnificent ruins of Copan to the long, narrow houses of the Iroquois.

PROF. WILLIAM SOMERVILLE'S sixth annual report on experiments with crop and stock in the counties of Cumberland, Durham and Northumberland, provides an excellent example of useful technical education assisted by County Councils. In the work of agricultural demonstration described in the pages of the report, the Durham College of Science was associated with the Councils of the counties above referred to, and the information given will be distinctly valuable to the agriculturists of these counties. Of especial importance are the results of rotation experiments which have been carried on for four years on three Northumberland farms. The results obtained at these stations are tabulated, but the detailed discussion of the rotation experiments has not yet been completed.

THE fourth number of "The Psychological Index"—a bibliography of the literature of psychology and cognate subjects for 1897, compiled by L. Farrand and Howard C. Warren—is a most useful publication for psychologists. The papers are well classified, and there is an index of authors; so it is easy to find what contributions have been made to the various branches of the science, and what the various investigators have done. There are 2465 titles in the Index, thus indicating considerable activity in psychological science. The Index is issued in connection with the *Psychological Review*, which is published bi-monthly by the Macmillan Company.

A *Bulletin* (No. 13, new series), containing a compilation, by Dr. L. O. Howard, of recent laws and regulations against injurious insects, and especially the San José scale, has been issued by the U.S. Department of Agriculture. The information given will be of interest to persons engaged in trade with living plants, and to horticultural and agricultural societies and others wishing to propose legislation of the kind described. Another *Bulletin* (No. 12), just issued by the U.S. Department of Agriculture, gives an account of the spread of the San José scale in the United States during the last two years, and of the work which has been done by economic entomologists in the effort to subdue it.

THE latest phases of the controversy concerning the place where John Cabot first landed in North America four hundred years ago, are presented in a paper by Dr. S. E. Dawson, on "The Voyages of the Cabots," published in the *Transactions* of the Royal Society of Canada for 1897. Dr. Dawson concludes "that there is no physical or geographical reason *à priori* why Cape Breton may not have been Cabot's landfall, and that the voyage was intended to be upon a westerly course. It will also appear that all the conditions existing upon the North Atlantic tend to make a westerly course swerve to the south, and that there is, therefore, a strong preponderance of probability in favour of a landfall at Cape Breton." Positive evidence of contemporary documents is shown to point to the same conclusion.

MESSRS. MASSON AND CO., Paris, will shortly publish the following works of science:—"L'Anatomie comparée des animaux basée sur l'embryologie," by Prof. Louis Roule; "Précis de Botanique médicale," by Prof. L. Trabut; "Eléments de Botanique," by Prof. Ph. van Tieghem.

MR. T. R. DALLMEYER has just published a useful little book entitled "A Simple Guide to the Choice of a Photographic Lens." This book seems to be exactly suited to the requirements of a whole host of photographers, especially amateurs who prefer to have their information retailed concisely and simply by one who knows. A great feature of these thirty pages is the appeal to diagrams which illustrate more clearly than words many fundamental facts regarding lenses and their behaviour. Four excellent platino-bromide reproductions are inserted, to illustrate the capabilities of the author's new universal stigmatic lens, Series ii. F/6, which does the work of practically four ordinary lenses.

THE firm of Gustav Fischer, Jena, announces for early publication the following new works and new editions:—"Ueber Herzbewegung und Herzstoss," by Dr. Ludwig Braun. This volume will contain the results of an experimental study of movements of the heart, analysed by means of a kinematograph.—"Die Bakteriologie in der Milchwirtschaft," by Dr. E. von Freudenreich.—The second part of Dr. Oscar Hertwig's work on "Die Zelle und die Gewebe," dealing with the general anatomy and physiological properties of the tissues.—"Beiträge zur Klinik der Rückenmarks-und Wirbeltumoren," by Dr. H. Schlesinger.—The first section of "Mitteilungen aus der Augenklinik," by Dr. J. Widmark.—The fourth enlarged edition of Dr. Robert Wiedersheim's "Grundriss der vergleichenden Anatomie der Wirbeltiere."

THE Chemical Publishing Company, Easton, Pennsylvania, has published a second, thoroughly revised edition of "Laboratory Experiments on the Class Reactions and Identification of Organic Substances," by Dr. A. A. Noyes and S. P. Mulliken. A sixth edition of Mr. P. McConnell's serviceable "Note-book of Agricultural Facts and Figures for Farmers and Farm Students" has been published by Messrs. Crosby Lockwood and Co.—The present state of knowledge of Röntgen radiation and its practical applications is well stated in the second edition of "Practical Radiography" by A. W. Isenthal and H. Snowden Ward, published by Messrs. Dawbarn and Ward. Many of the illustrations in the book are very fine.—A revised and enlarged edition (the sixth) of Messrs. Marion and Co.'s well-known "Practical Guide to Photography" has just been issued.

THE additions to the Zoological Society's Gardens during the past week include four Silver Pheasants (*Euplocamus nycthemerus*) from China, presented by Mr. H. J. Veitch; a Common Barn Owl (*Strix flammea*), captured at sea, presented by Captain George Innes; a Black-winged Peafowl (*Pavo nigripennis*, ♂) from Cochin China, presented by Mr. Richard H. J. Gurney; four Undulated Grass Parrakeets (*Melopsittacus undulatus*) from Australia, presented by Mr. Aitchinson; a Black-bellied Sand Grouse (*Pterocles arenarius*) from Asia, a Pin-tailed Sand Grouse (*Pterocles alchata*), South European, a Rosy Bullfinch (*Erythrospiza githaginea*) from Algeria, presented by Mr. E. G. B. Meade-Waldo; two Common Bluebirds (*Sialia wilsoni*) from North America, two Yellow-bellied Liothrix (*Liothrix luteus*) from China, an Amaduvade Finch (*Estrelda amandava*) from India, a Red-bellied Waxbill (*Estrelda rubriventris*), a Crimson-eared Waxbill (*Estrelda phœnicotis*) from West Africa, presented by Miss Edith M. Kemp Welch; four

Amaduvade Finches (*Estrelda amandava*), a Green Waxbill (*Estrelda formosa*), two Black-headed Finches (*Munia malacca*), two Chestnut-bellied Finches (*Munia rubro-nigra*), three Indian Silver-bills (*Munia malabarica*) from India, a Common Waxbill (*Estrelda cinerea*), three Orange-cheeked Waxbills (*Estrelda melpoda*), two Red-bellied Waxbills (*Estrelda rubriventris*), a Paradise Whydah Bird (*Vidua paradisea*), a Grenadier Weaver Bird (*Euplectes oryx*) from West Africa, three Banded Grass Finches (*Poëphila cincta*) from Queensland, a Bar-breasted Finch (*Munia nisoria*) from Java, a Maja Finch (*Munia maja*) from Malacca, a Chestnut-eared Finch (*Amadina castanotis*) from Australia, presented by Miss Petrocochino; two Black Rats (*Mus rattus*) from the Channel Islands, presented by Mr. J. Ernest Ardron; a Common Otter (*Lutra vulgaris*), British, presented by Mr. A. P. Ashburnham; three Hairy-footed Jerboas (*Dipus hirtipes*) from North-east Africa, presented by Miss Baird; a Green-cheeked Amazon (*Chrysotis viridigena*) from Colombia, deposited; a Collared Fruit Bat (*Cynonycteris collaris*), a Yellow-cheeked Lemur (*Lemur xanthomystax*), a Crested Porcupine (*Hystrix cristata*), two Squirrel-like Phalangers (*Petaurus sciureus*), a Red Kangaroo (*Macropus rufus*), born in the Gardens.

OUR ASTRONOMICAL COLUMN.

ASTRONOMICAL OCCURRENCES IN MAY :—

May 2.	11h. 24m. to 12h. 11m. B.A.C. 4006 (mag. 5·7) occulted by the moon.
2.	21h. Jupiter in conjunction with moon. Jupiter 6° 58′ N.
6.	Vesta (mag. 6·5) in opposition to the sun. In Libra.
7.	6h. 36m. α Scorpii (Antares) in conjunction with moon. α Scorpii, 1¼° S.
7.	12h. Saturn in conjunction with moon. Saturn 5° 7′ N.
11.	13h. 16m. to 13h. 51m. B.A.C. 7263 (mag 6) occulted by moon.
13.	Uranus 52′ S. of β Scorpii (mag. 3).
15.	Venus. Illuminated portion of disc 0·923.
15.	Mars. ,, ,, ,, 0·936.
18.	18h. Venus in conjunction with Neptune. Venus 2° 19′ N.
20.	Saturn. Outer minor axis of outer ring, 18″·69.
20.	Ceres 16′ N. of β Geminorum (Pollux).
22.	4h. Uranus in opposition to the sun. In Scorpio.
22.	6h. 54m. to 7h. 32m. Venus occulted by moon.
24.	Encke's Comet arrives at perihelion.
29.	22h. Saturn in opposition to the sun. In Scorpio.
30.	5h. Jupiter in conjunction with moon. Jupiter 7° 1′ N.

DOUBLE AND MULTIPLE SOUTHERN STARS.—The observation of double and multiple stars in the southern heavens has never been attempted on a large scale, although several observers have turned their attention to these bodies with not very large apertures. Sir John Herschel, in his southern sweep for nebulæ and clusters, was enabled to detect over 2000 new double stars; but his chief interest was more for the close examination of the former celestial objects than for the search for double stars. Since that time the Sydney Observatory, the Cape Observatory, and the Harvard observers at Arequipa have done much to promote our knowledge of this class of southern stars. A search on a large scale has recently been undertaken by Dr. T. J. J. See, who was invited by Mr. Lowell to undertake a survey of the southern heavens for the discovery and measurement of new double stars and nebulæ with the 24-inch refractor, which had just been completed by the Clarks. In the *Astronomical Journal* (Nos. 431–432) Dr. See gives us some details of his plan of work, together with the first part of the catalogue of new double stars. In this survey Dr. See was aided by Mr. Cogshall. The observing station was first at Mars' Hill, Flagstaff; next in Mexico, in the western part of Tacubaya; and then again at Flagstaff, the telescope in each case being dismounted and re-erected.

The region of the sky embodied in this work includes the entire zone between −20° and −45°, and the more southern region swept over in Mexico lies between −45° and −65° between 4h. and 16h. Right Ascension. Dr. See states: "In the course of this work it is certain that we have examined carefully not less than one hundred thousand stars, and many of them doubtless on several occasions." All the star places have been referred to the equator and mean equinox of 1900·0, and in each case the colours are given after a terminology which was found best to describe the tints of the spectrum. To give an idea of the quality of the object-glass used, and the excellent atmospheric conditions at Flagstaff, we may mention that an object was not considered difficult unless it was below 0″·3, or fainter than the 14th magnitude for fairly wide objects. Dr. See proposes to arrange the final catalogue in two parts: the first giving the new doubles, and the second doubles recognised by previous observers. He further uses the symbol λ to denote "stars discovered at the Lowell Observatory," and an index 1 being affixed to this letter in the first catalogue, and other numbers in subsequent catalogues. When completed, this great work will prove a most valuable contribution to our knowledge of many interesting systems in the southern hemisphere.

COMET PERRINE.—The following is a continuation of the ephemeris given previously in this column:—

12h. Berlin Mean Time.

1898.	R.A.			Dec.		log *r*	log Δ	Br.
	h.	m.	s.	°	′			
April 28	0	20	32	+49	28·1			
29		25	59	49	56·0			
30		31	26	50	22·6	0·1171	0·2675	0·52
May 1		36	53	50	48·0			
2		42	21	51	12·3			
3		47	49	51	35·4			
4		53	16	51	57·4	0·1285	0·2799	0·47
5	0	58	43	+52	18·3			

THE MANORA OBSERVATORY.—In a recent number of the *Naturwissenschaftliche Wochenschrift* (Band xiii. No. 14), Herr Leo Brenner gives a condensed account of the observations made at the Manora Observatory during the past year. As usual, the observations are chiefly restricted to minute examinations of the surface markings of planets. The article is illustrated by reproductions of the observatory and instruments and drawings of the surface markings of some of the planets. Herr Brenner refers to the question that has been raised regarding the financial condition of the observatory. In his concluding remarks he adds: "For the main part my work this year will depend on whether a change occurs in the financial condition of the observatory, or whether I shall be obliged, as formerly, to waste my time in writing worthless scientific articles."

THE HARVARD COLLEGE OBSERVATORY.—The fifty-second annual report of the director of the Astronomical Observatory of Harvard College gives us an idea of the immense amount of work which is being carried on so successfully under his supervision. Not only are extensive investigations undertaken, but they are brought to completion by the liberal staff with which he is provided. After referring to the large endowment for current expenses which renders such assistance possible, Prof. Pickering adds that as regards permanent plant they are far behind other observatories even of the second class. That this will be soon remedied there is no doubt; and Prof. Pickering has the happy faculty of knowing from which direction such donations will come, for he says, "the need of modern buildings is most likely to be supplied by gifts or bequests from persons whose names should be attached to them. For instance, a library building in which the clerical work of the institution could be performed is greatly needed. A modern machine-shop to replace our present workshop would form an excellent memorial of one who had been interested in the application of the mechanic arts to scientific uses." As usual, each of the instruments has been used for extensive investigations. The east equatorial has been employed for photometric light comparisons of variables mostly with the new polarising photometer, while the west instrument has been used for similar observations of variables and comparison stars. The meridian circle and meridian photometer have also been continuously employed, Prof. Pickering having worked with the latter on 152 nights, and made 100,052 photometric settings. The researches planned for this latter instrument are, we are told, approaching completion, 860,000 measures of about 40,000 stars having been made during the last twenty years. Both the 8-inch telescopes have been used for photographing stellar spectra, the number of photographs